FUNDAMENTAL PERFORMANCE LIMITS OF TIME DIVISION SQUID MULTIPLEXERS

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ABSTRACT

SQUID multiplexers make it possible to build arrays of thousands of low-temperature bolometers based on superconducting transition-edge sensors (TES) with a manageable number of readout channels. We are developing time-division SQUID multiplexers. Our first-generation, 8-channel SQUID multiplexer has been used in FIBRE, a one-dimensional TES array for submillimeter astronomy. Our second-generation 32-pixel multiplexer, based on an improved architecture, is now being developed for submillimeter instruments including SAFIRE, which will fly on SOFIA, and SCUBA-2, a submillimeter camera with more than 12,800 pixel to be deployed on the JCMT. In spite of the scale of these instruments, we are still far from the fundamental performance limits of time-division SQUID multiplexers. We discuss the fundamental performance limits of time-division SQUID multiplexers, describe the limitations of current implementations, and discuss the development necessary to approach the fundamental limits.

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